Quick Start Guide

# RA6M3 Group

## Evaluation Kit for RA6M3 Microcontroller Group
## EK-RA6M3
## Quick Start Guide

Renesas RA Family
RA6 Series

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The product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures:

• Ensure attached cables do not lie across the equipment.

• Reorient the receiving antenna.

• Increase the distance between the equipment and the receiver.

• Connect the equipment into an outlet on a circuit different from that which the receiver is connected.

• Power down the equipment when not in use.

• Consult the dealer or an experienced radio/TV technician for help.

Note: It is recommended that wherever possible shielded interface cables are used.

The product is potentially susceptible to certain EMC phenomena. To mitigate against them it is recommended that the following measures be undertaken:

• The user is advised that mobile phones should not be used within 10 m of the product when in use.

• The user is advised to take ESD precautions when handling the equipment.

The Evaluation Kit does not represent an ideal reference design for an end product and does not fulfill the regulatory standards for an end product.

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Renesas RA Family

# EK-RA6M3

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# 1. Introduction

This Quick Start Guide (QSG) provides:

- An overview of the Quick Start example project that the EK-RA6M3 board comes pre-programmed with.
- Instructions for running the Quick Start example project.
- Instructions for importing, modifying, and building the Quick Start example project using Flexible Software Package (FSP) and e$^2$ studio Integrated Development Environment (IDE).

## 1.1 Assumptions and Advisory Notes

1. Tool experience: It is assumed that the user has prior experience working with IDEs such as e$^2$ studio and terminal emulation programs such as Tera Term.
2. Subject knowledge: It is assumed that the user has basic knowledge about microcontrollers, embedded systems, and FSP to modify the example project described in this document.
3. Prior to running the Quick Start example project or programming the EK-RA6M3 board, default jumper settings must be used. Refer to the EK-RA6M3 user's manual for the default jumper settings.
4. The screen shots provided throughout this document are for reference. The actual screen content may differ depending on the version of software and development tools used.

# 2. Kit Contents

The following components are included in the kit:

1. EK-RA6M3 board
2. Micro USB device cable (type-A male to micro-B male)
3. Micro USB host cable (type-A female to micro-B male)
4. Ethernet patch cable

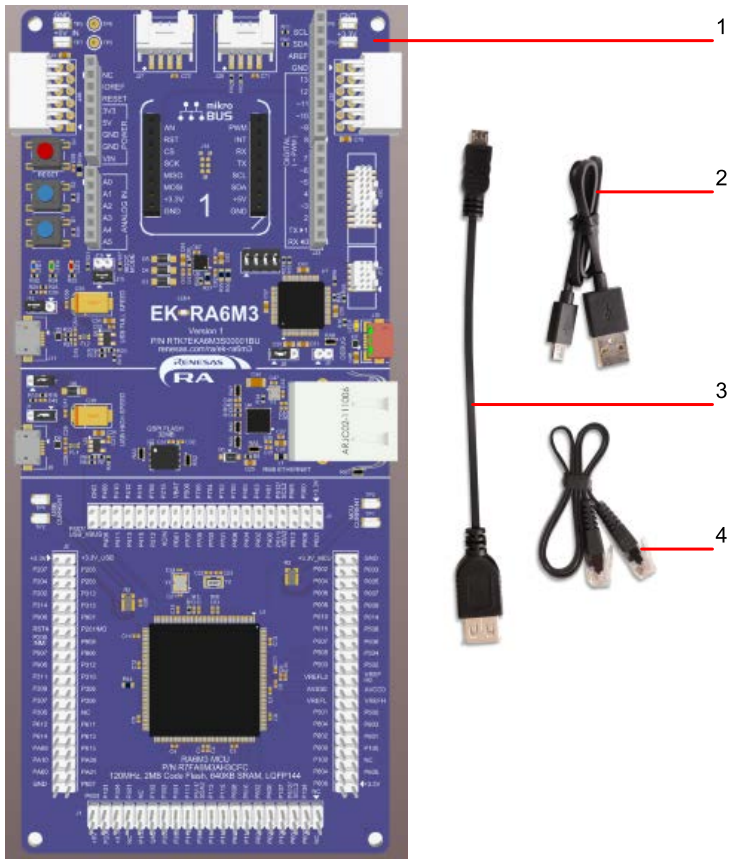



**Figure 1. EK-RA6M3 Kit Contents**



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# 3. Overview of the Quick Start Example Project

The Quick Start example project allows the user to change the frequency and intensity of the on-board user LEDs (LED1, LED2, and LED3) using the user buttons (S1 and S2). The supported frequencies are 1 Hz, 5 Hz, and 10 Hz and the supported intensities are 10%, 50% and 90%.

When the EK-RA6M3 board running the Quick Start example project is connected to a host PC via USB as a Full Speed CDC Device, the kit information, MCU die temperature, user LED blinking frequency, and so forth, can be displayed on a terminal console.

## 3.1 Quick Start Example Project Flow

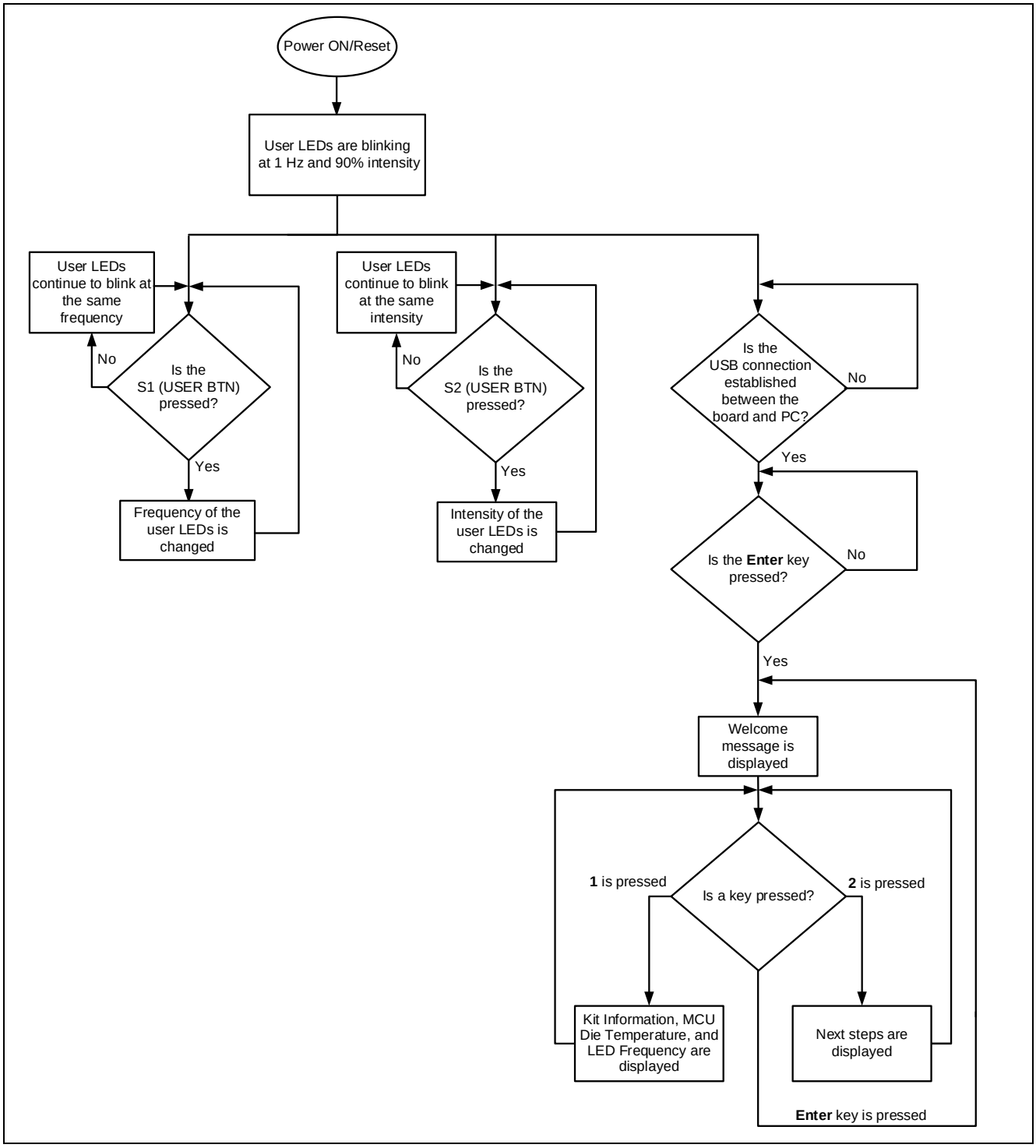



**Figure 2. Quick Start Example Project Flow**



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# 4. Running the Quick Start Example Project

This section lists the requirements and instructions to power up the EK-RA6M3 board and run the Quick Start example project.

**Hardware Requirements**

- EK-RA6M3 board
- Micro USB device cable
- A PC with at least 1 USB port

**Software Requirements**

- Windows® 10 operating system
- USB Serial Drivers (included in Windows 10)
- Tera Term (or similar) terminal console application

## 4.1 Connecting and Powering Up the EK-RA6M3 Board

1. Connect the micro USB end of the micro USB device cable to micro-AB USB Full Speed port (J11) of the EK-RA6M3 board.
2. Connect the other end of this cable to the USB port of the host PC. Power LED (LED4) on the EK-RA6M3 board lights up white, indicating that the EK-RA6M3 board is powered on.

Note: If the EK-RA6M3 board is not powered through micro-AB USB Full Speed port (J11) and the host PC, then USB CDC functionality of the Quick Start example project cannot be demonstrated because of the absence of a USB Full Speed Device connection with the host PC.

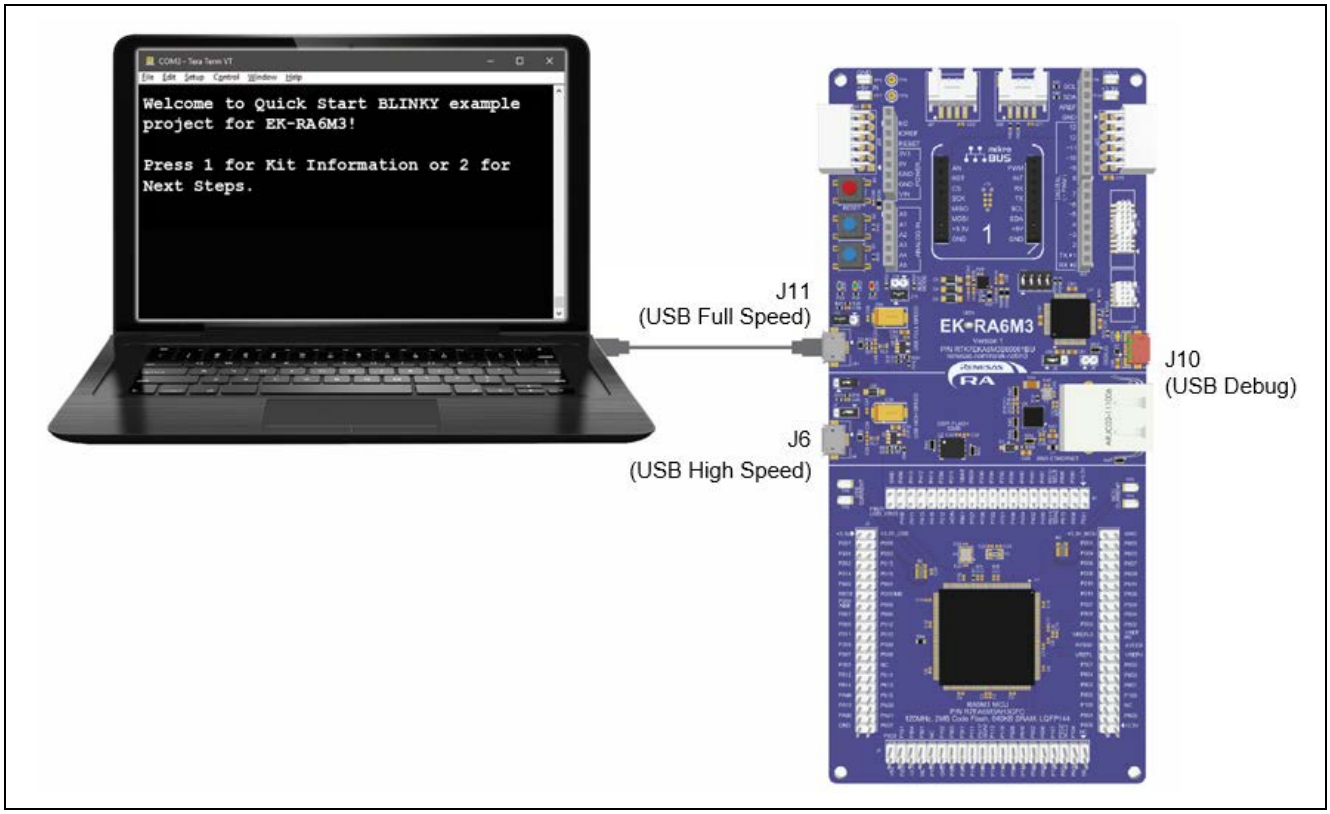



**Figure 3. Connecting the EK-RA6M3 Board to the Host PC via USB Full Speed Port**



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## 4.2 Running the Quick Start Example Project

To run the Quick Start example project, use the following instructions:

1. On power up or RESET, the three user LEDs (blue LED1, green LED2, and red LED3) start blinking at 1 Hz frequency and at 90% intensity.

   Note: The debug LED (LED5) will blink or light up orange; this can be ignored for now.

2. Press the first user button (S1) on the EK-RA6M3 board to change the blinking frequency of the user LEDs. With every press of the first user button (S1), the frequency will switch from 1 Hz to 5 Hz to 10 Hz and cycle back.
3. Press the second user button (S2) on the board to change the intensity of the user LEDs. With every press of the user button (S2), the intensity will switch from 90% to 50% to 10% and cycle back.
4. On the host PC, open Windows Device Manager. Expand **Ports (COM & LPT)**, locate **USB Serial Device (COMxx)** and note down the COM port number for reference in the next step.

Note: USB Serial Device drivers are required to communicate between the EK-RA6M3 board and the terminal application on the host PC.

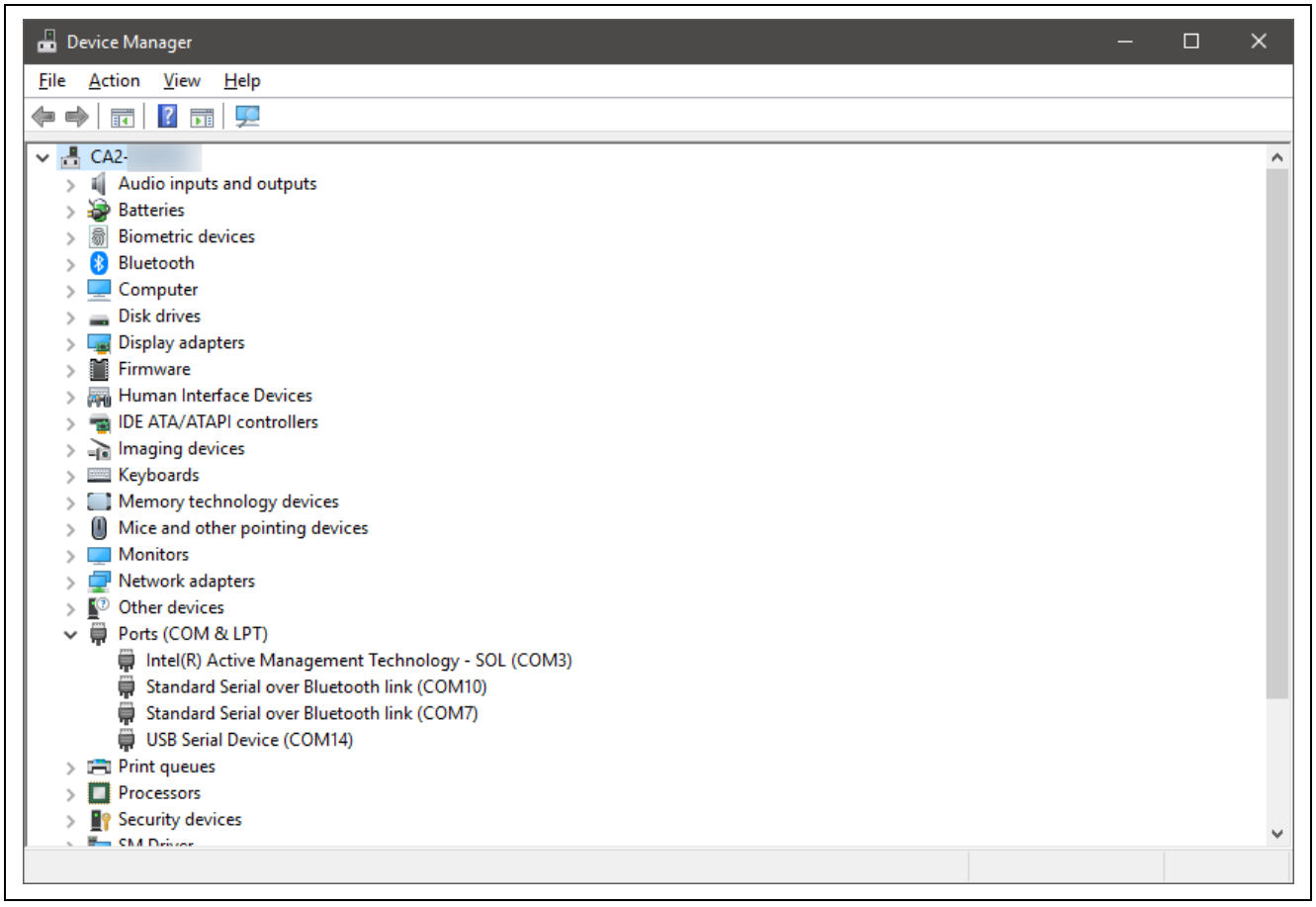



**Figure 4. USB Serial Device in Windows Device Manager**



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5. Open Tera Term, select **Serial** and **COMxx: USB Serial Device (COMxx)** and click **OK**.

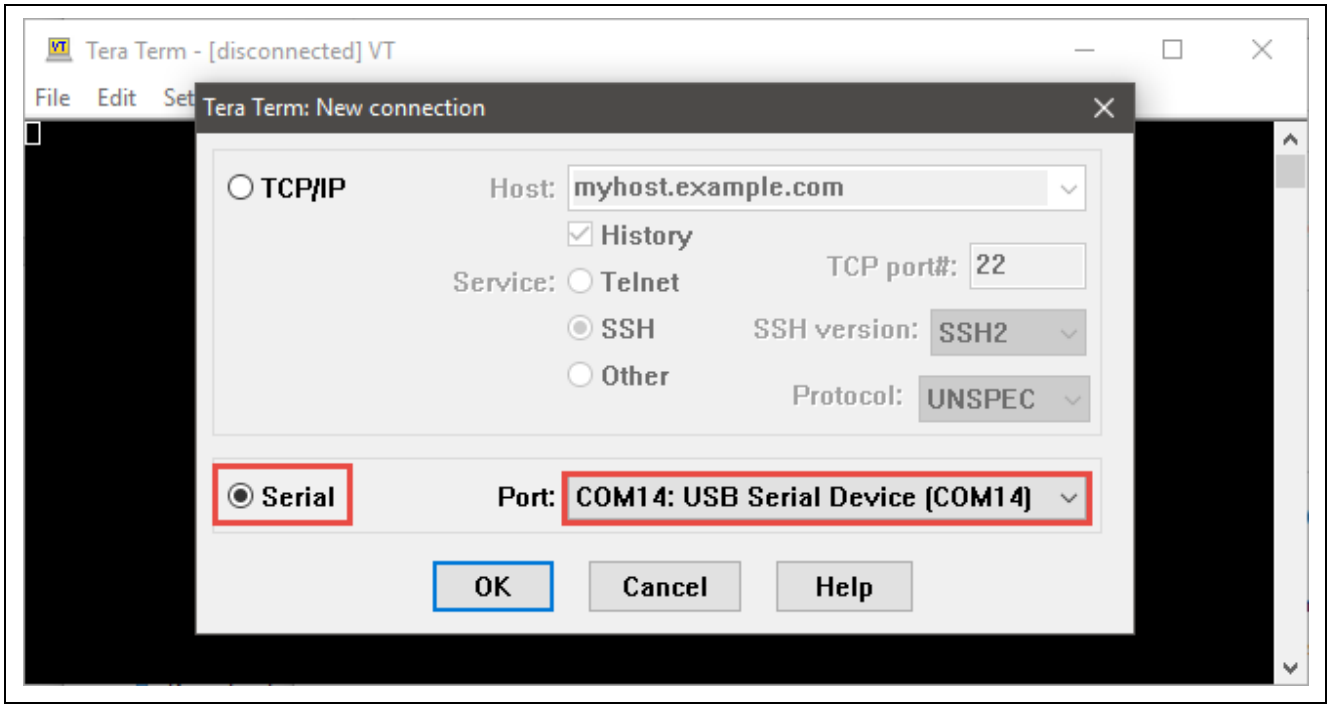



**Figure 5. Selecting the Serial Port on Tera Term**

6. Press **Enter** key. The welcome message will be displayed.

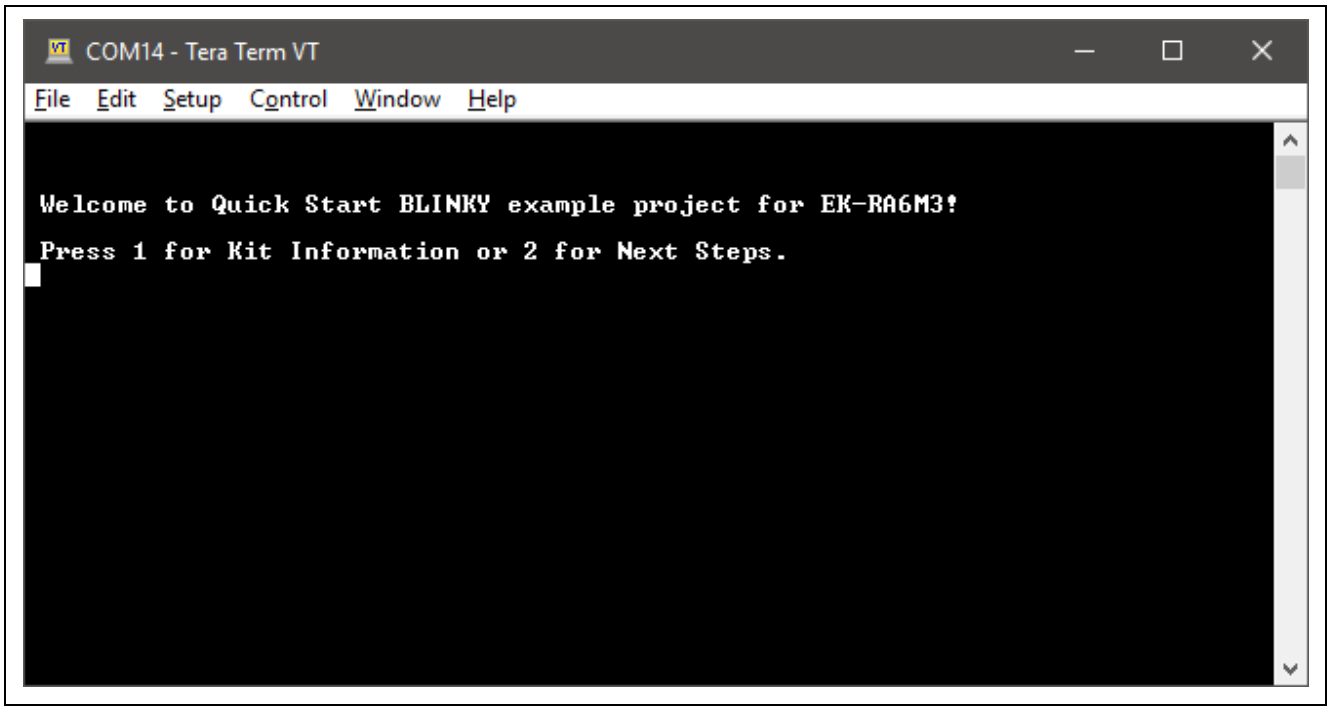



**Figure 6. Welcome Message**



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7. Press **1** to display the kit name, part number, MCU die temperature, and the user LEDs' current blinking frequency.

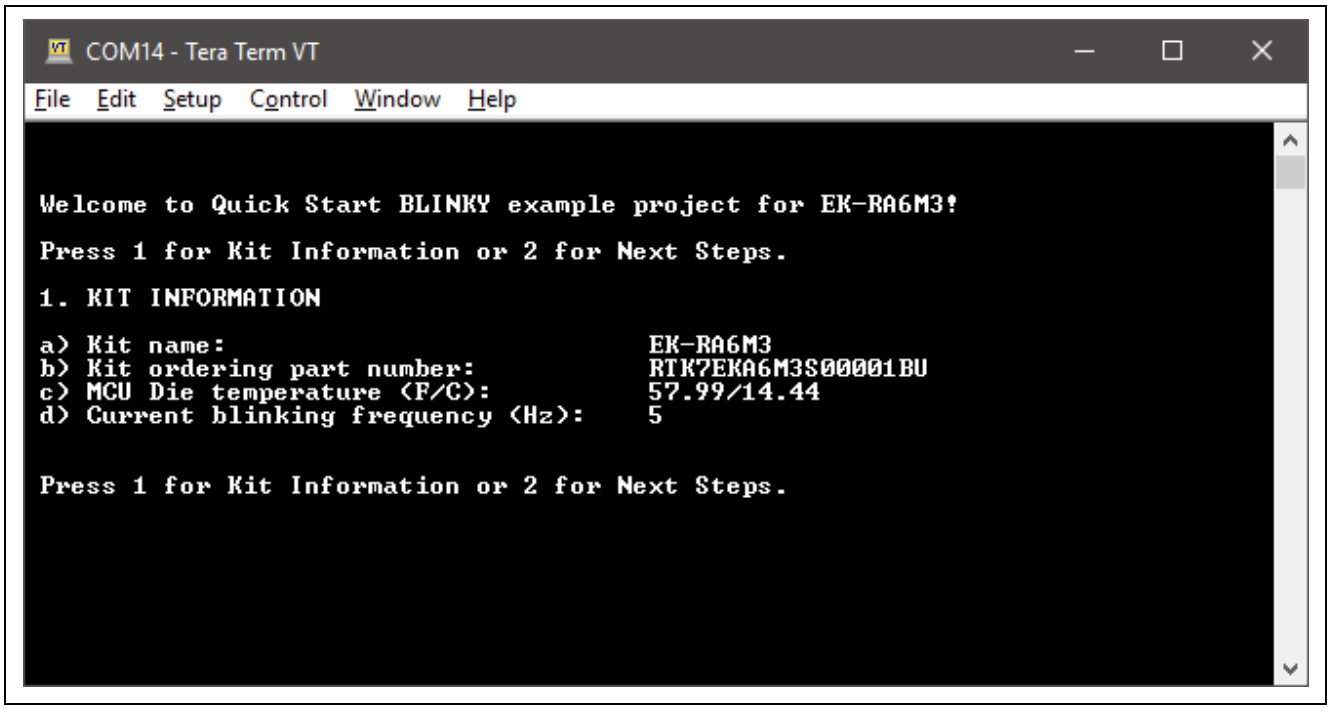



**Figure 7. Kit Information**

8. Press **2** to display Next Steps.

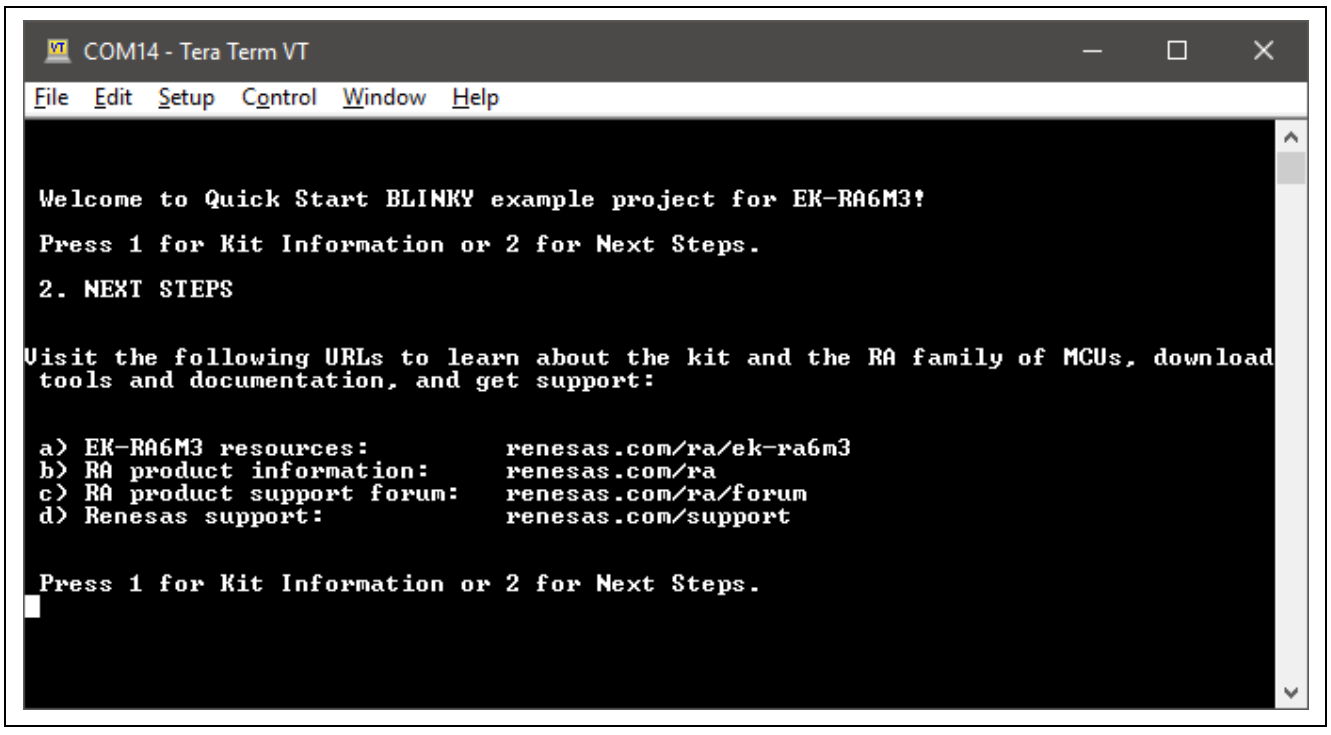



**Figure 8. Next Steps**

Note: At any point, the user can press the **Enter** key to return to the welcome message.



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# 5. Customizing the Quick Start Example Project

This section lists the requirements and instructions for customizing the Quick Start example project.

**Hardware Requirements**

- EK-RA6M3 board
- Micro USB device cable
- A PC with at least 1 USB port

**Software Requirements**

- Windows® 10 operating system
- e² studio IDE
- SEGGER J-Link® USB drivers
- FSP
- Quick Start example project

## 5.1 Downloading and Installing Software and Development Tools

Before the Quick Start example project can be modified, it is necessary to download and install software and development tools on the host PC.

The FSP, J-Link USB drivers, and e² studio are bundled in a downloadable platform installer available on the FSP webpage at renesas.com/ra/fsp. New users are recommended to use the **Quick Install** option provided in the installation wizard, to minimize the amount of manual configuration needed.

There is no need to download and install software, development tools, and drivers separately.

## 5.2 Downloading and Importing the Quick Start Example Project

1. Download and extract the Quick Start example project to a local directory on the host PC.
   - The Quick Start example project (source code and project files) is available in the EK-RA6M3 Example Projects Bundle that is available in the Downloads tab of EK-RA6M3 webpage at renesas.com/ra/ek-ra6m3.
   - Download and extract the example projects bundle (`xxxxxxxxxxxxxxx-ek-ra6m3-exampleprojects.zip`) to a local directory on the host PC.
   - Browse to the Quick Start example project at `xxxxxxxxxxxxxxx-ek-ra6m3-exampleprojects\ek_ra6m3\_quickstart\quickstart_ek_ra6m3_ep`
2. Launch e² studio.
3. Browse to the Workspace where the project file is to be imported. Enter the name in the Workspace dialog box to create a new workspace.



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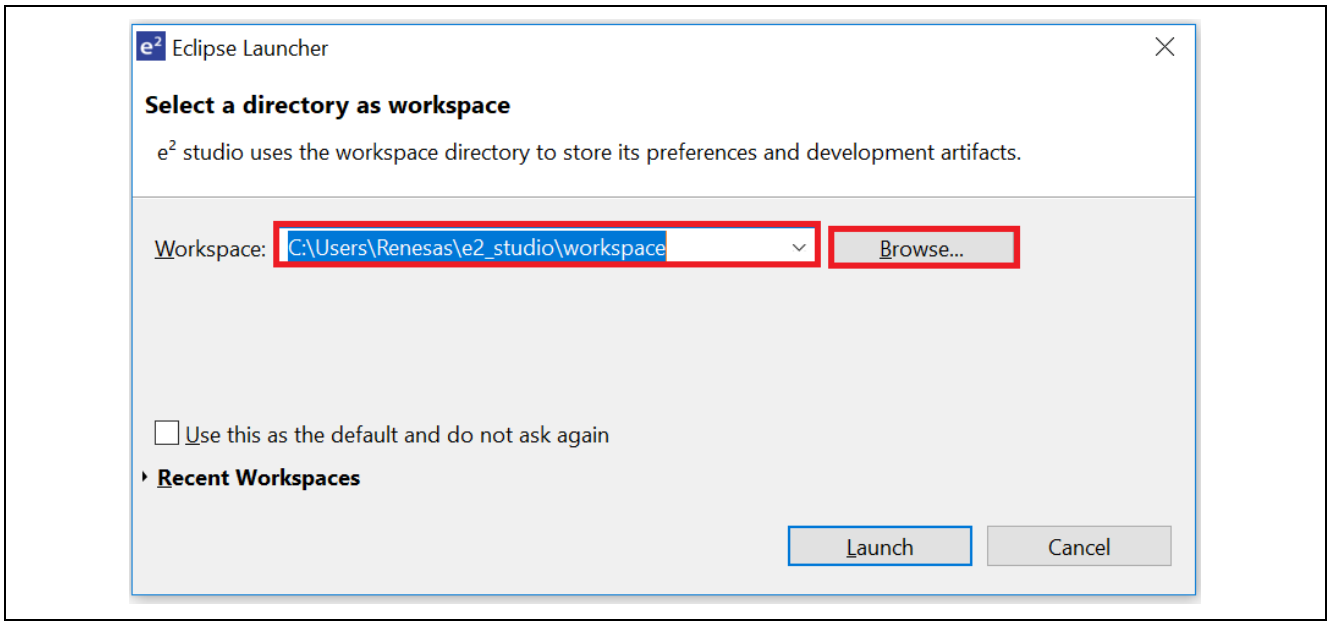



**Figure 9. Creating a New Workspace**

4. Click **Launch.**

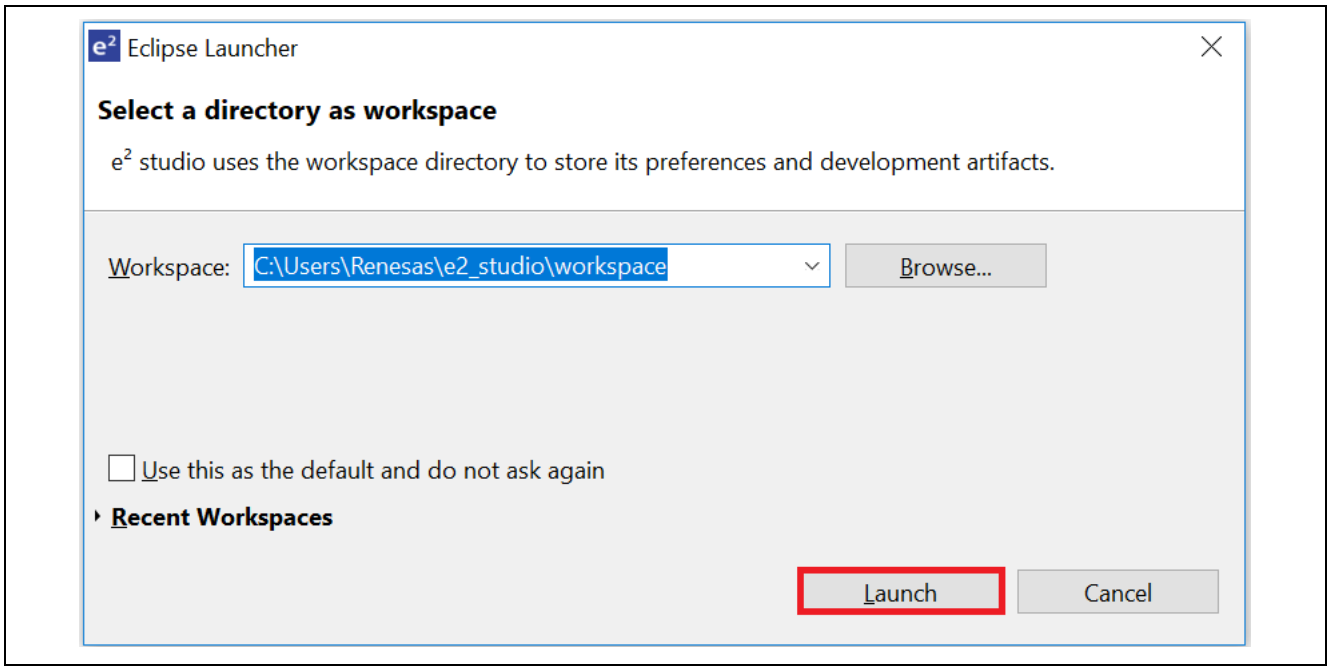



**Figure 10. Launching the Workspace**

5. Click **Import** from the **File** drop-down menu.



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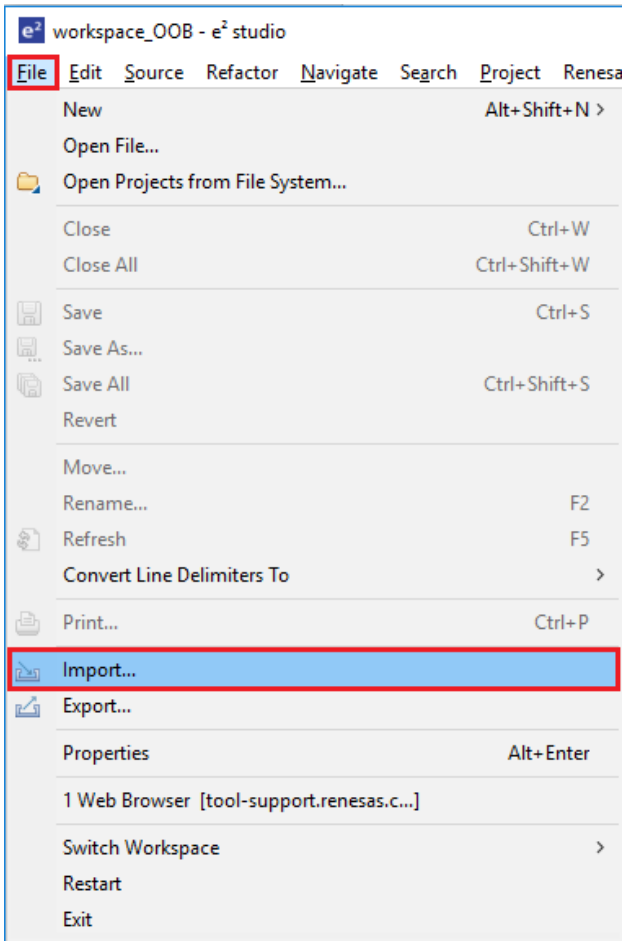



**Figure 11. Importing the Project**



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6. In the **Import** dialog box, select **General**, and then select **Existing Projects into Workspace**.

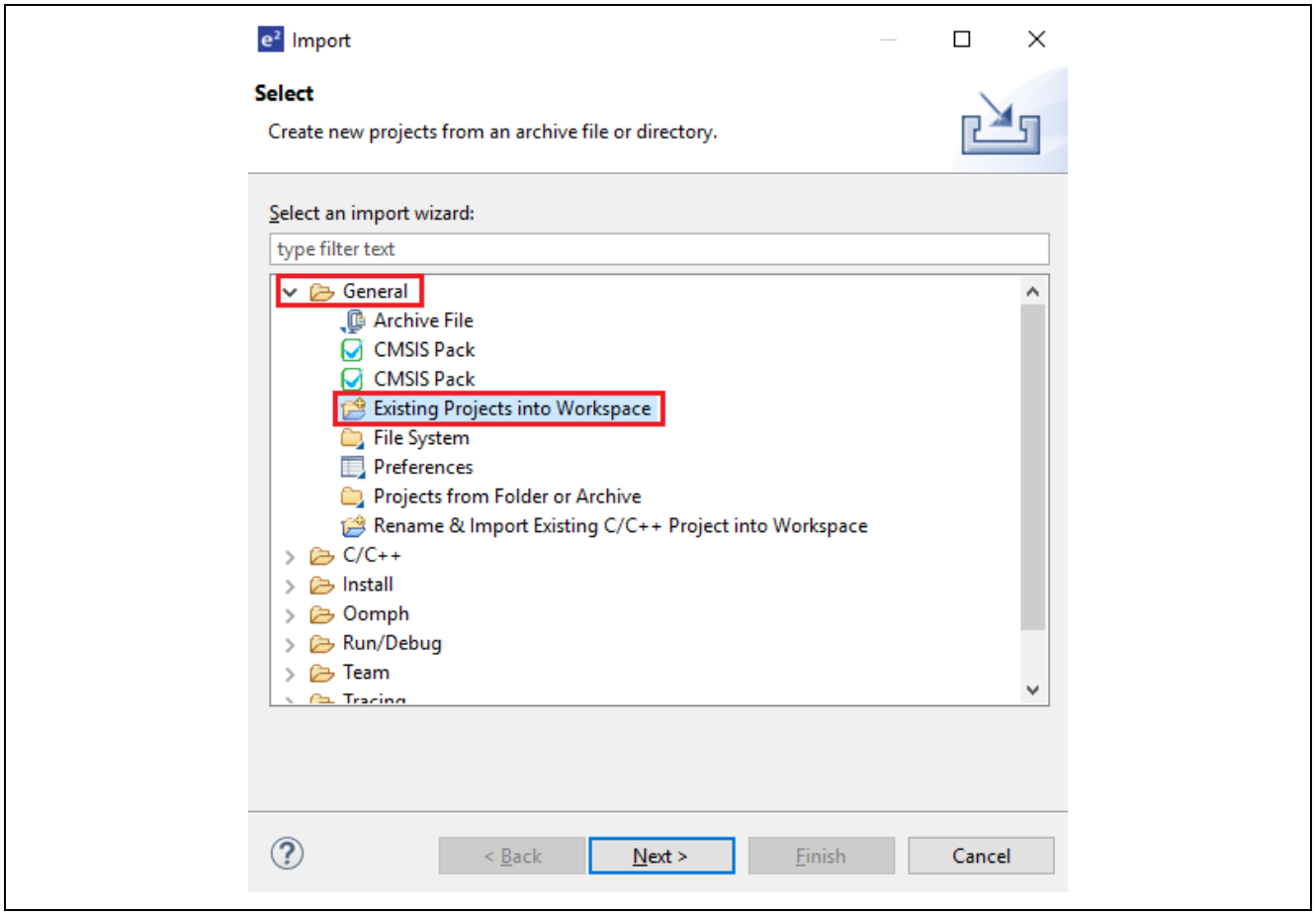



**Figure 12. Importing Existing Projects into the Workspace**

7. Click **Next**.

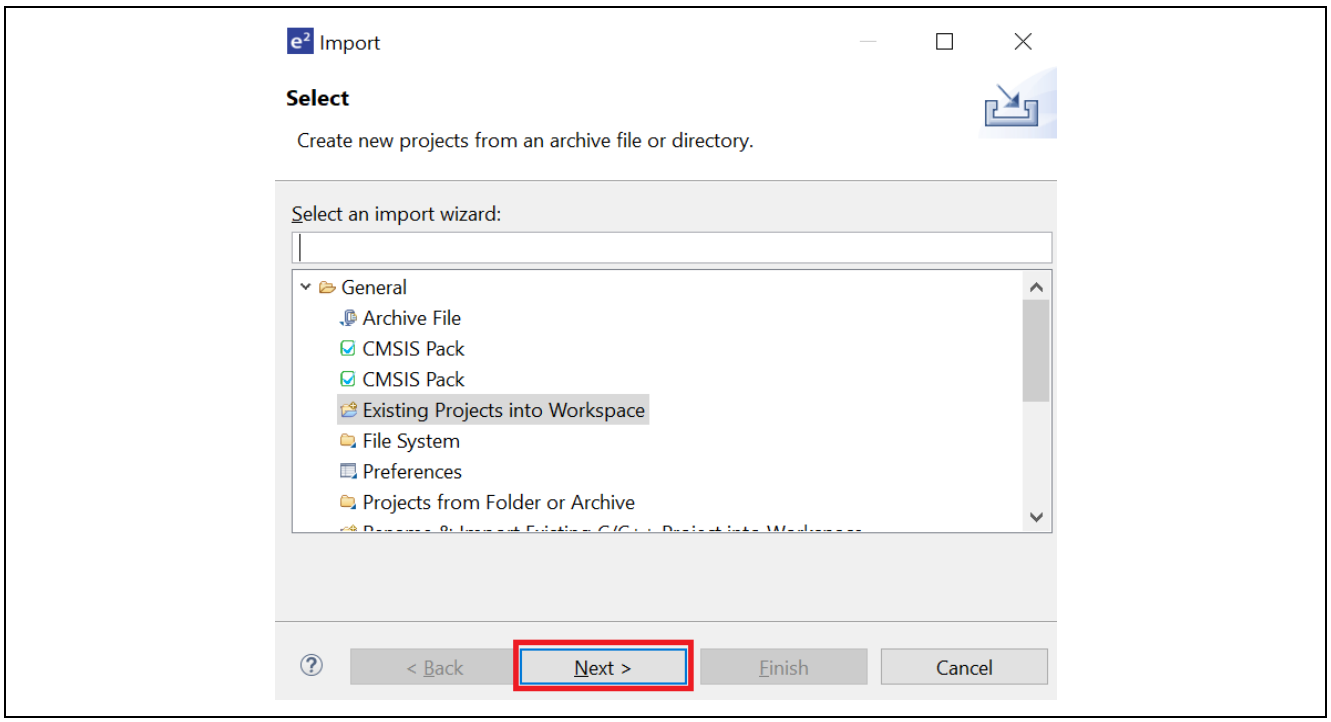



**Figure 13. Clicking Next to Import Existing Projects into the Workspace**



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8. Click **Select root directory** and click **Browse** to go to the location of the Quick Start example project folder.

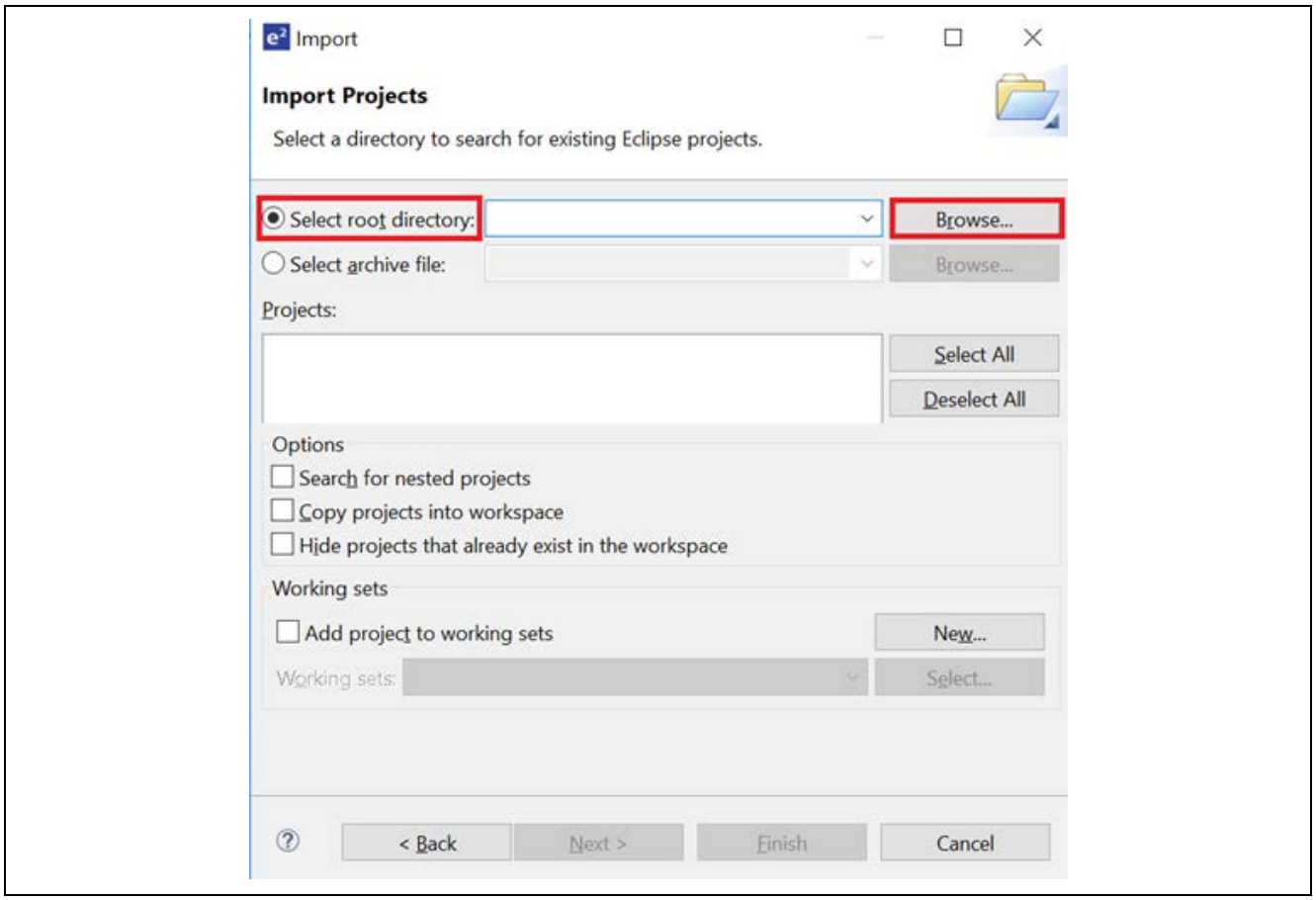



**Figure 14. Selecting the Root Directory**

9. Select the Quick Start example project and click **Finish**.

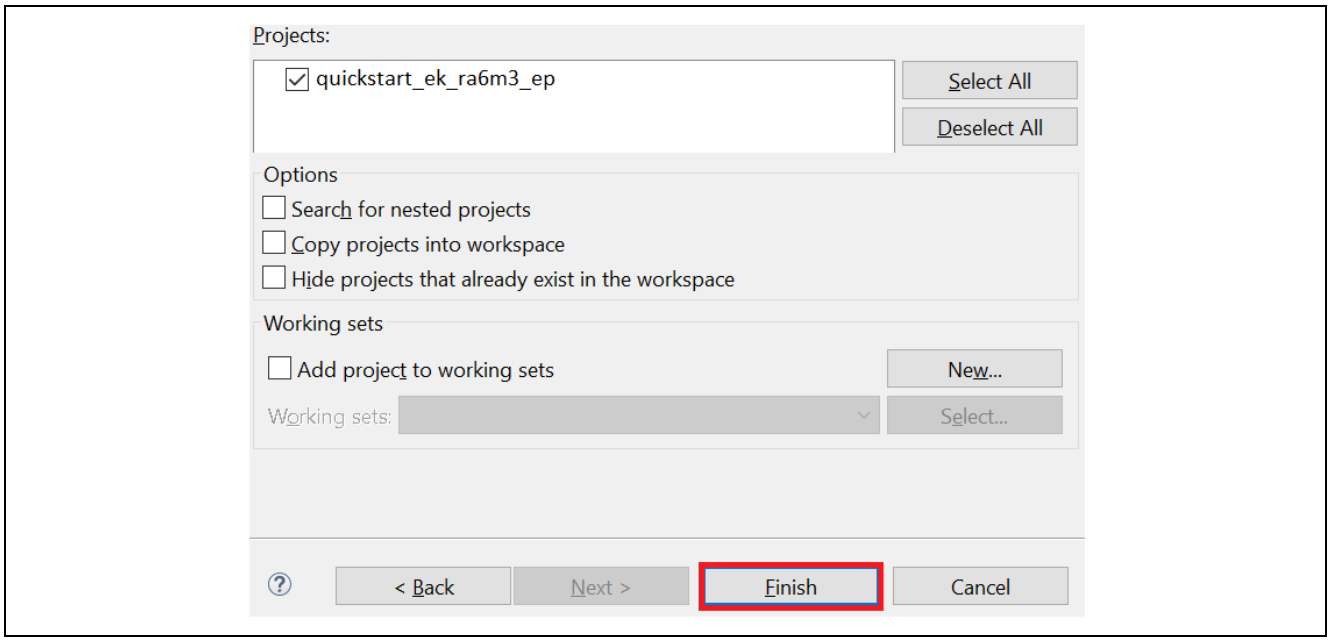



**Figure 15. Finishing Importing the Quick Start Example Project**

## 5.3 Modifying, Generating, and Building the Quick Start Example Project



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This section provides instructions to modify the Quick Start example project. The Quick Start example project can be modified by editing the source code and reconfiguring the properties of the MCU peripherals, pins, clocks, interrupts, and so forth.

Note: The specific modifications that can be performed to the Quick Start example project are not prescribed in this QSG. User discretion is advised while modifying the Quick Start example project.

1. Once the Quick Start example project is imported, click the **configuration.xml** file to open the configurator. The configurator provides an easy to use interface to configure the properties of MCU peripherals, pins, clocks, and so forth.

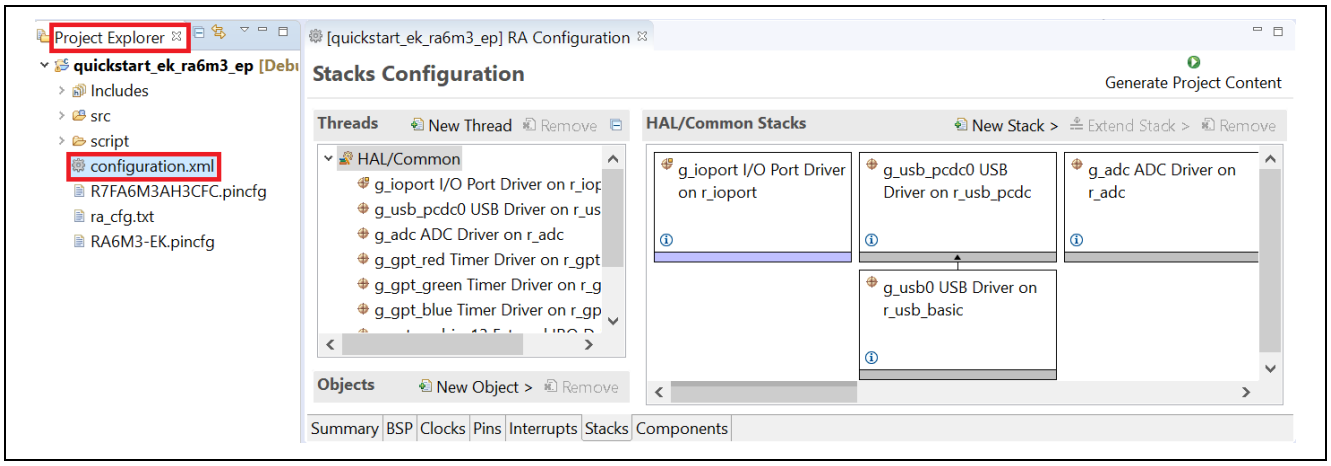



**Figure 16. Opening the Configurator**

2. For example, in the **Stacks** tab of the configurator, the user can click to select modules to modify the configuration settings, as required. The following screen shot illustrates modifying the ADC driver configuration.

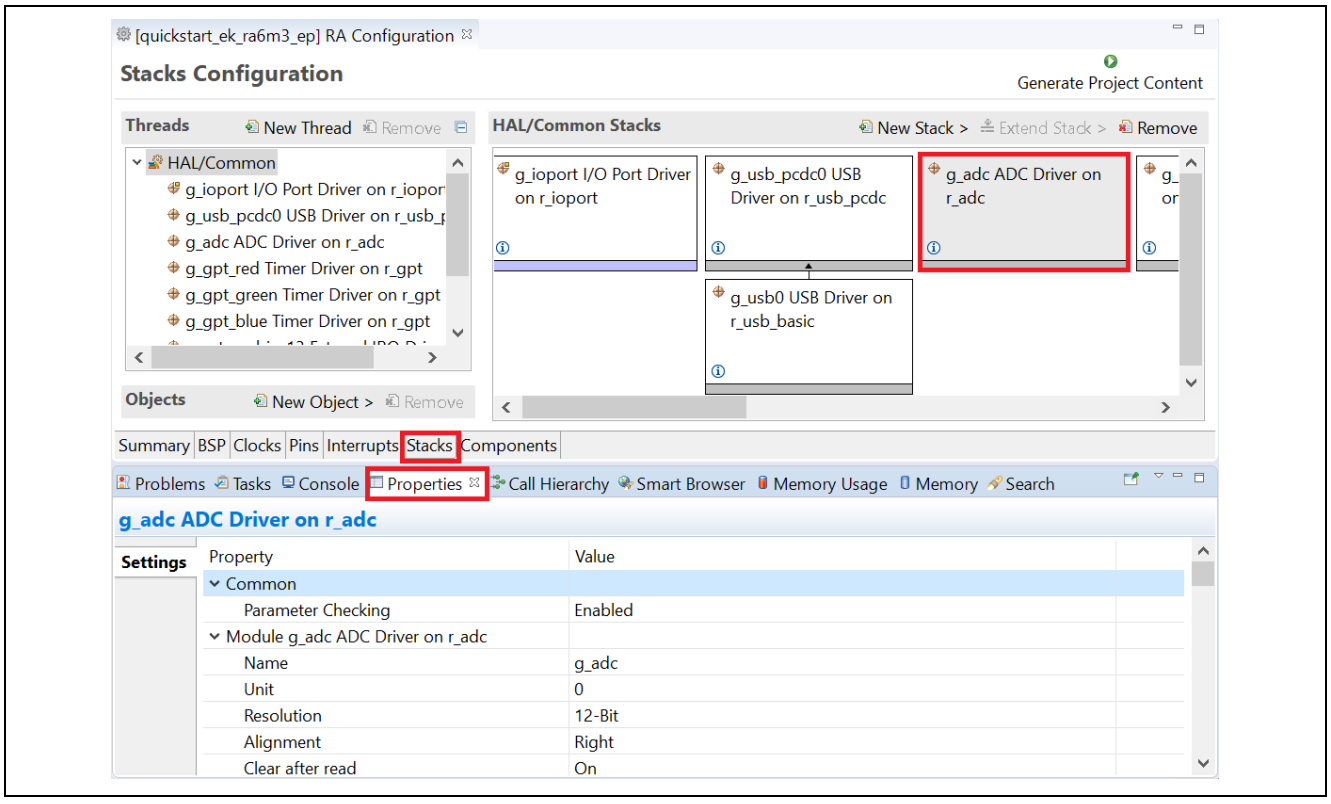



**Figure 17. Modifying the Configuration Settings**



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3. After the desired modifications are made, click **Generate Project**. A dialog box may appear with an option of saving the configuration changes. Click **Proceed**.

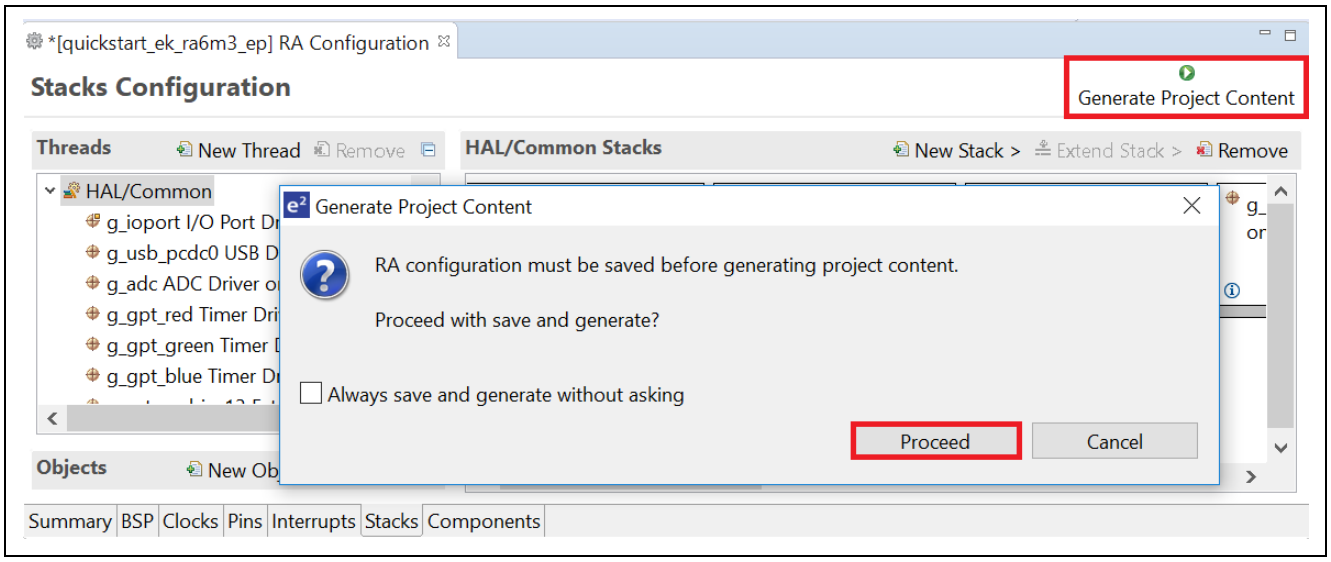



**Figure 18. Saving the Configuration Changes**

4. Modify the source files in the ***/src*** folder as needed and save the changes.
5. Build the project by clicking the build icon.

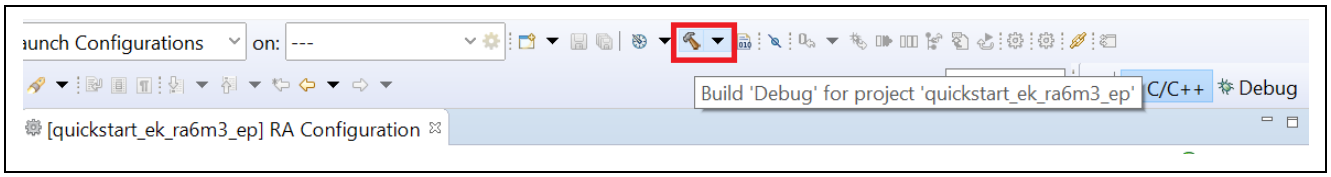



**Figure 19. Building the Project**

6. A successful build produces an output as follows.

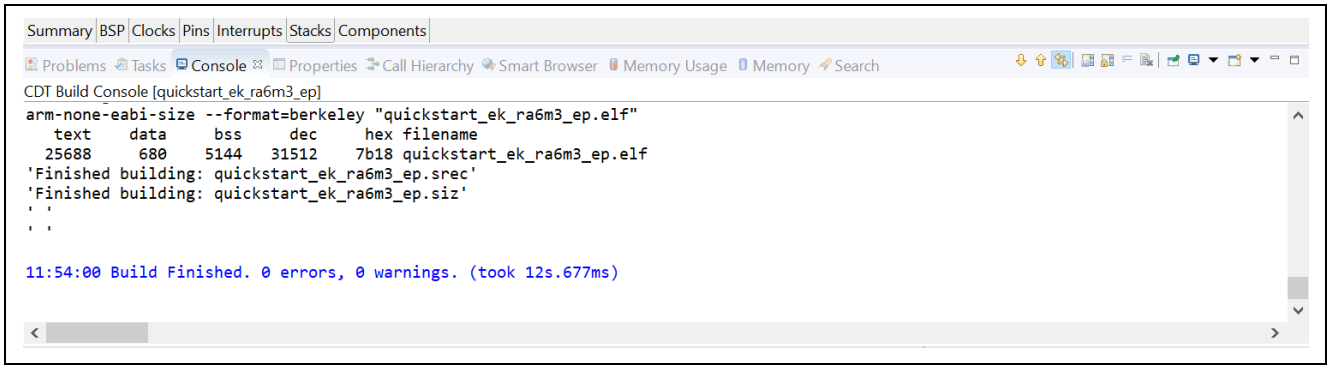



**Figure 20. Successful Build Output**



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## 5.4 Setting Up Debug Connection between the EK-RA6M3 board and Host PC

To program the modified Quick St example project on to the EK-RA6M3 board, a debug connection is necessary between the EK-RA6M3 board and host PC.

1. Disconnect the USB cable from micro-AB USB Full Speed port (J11) and connect it to micro-B USB debug port (J10) of the EK-RA6M3 board.

Note: The EK-RA6M3 board supports 3 debugging modes. In this section and the following sections, default debugging mode, Debug On-Board, is used. More information on debugging modes is available in EK-RA6M3 user's manual.

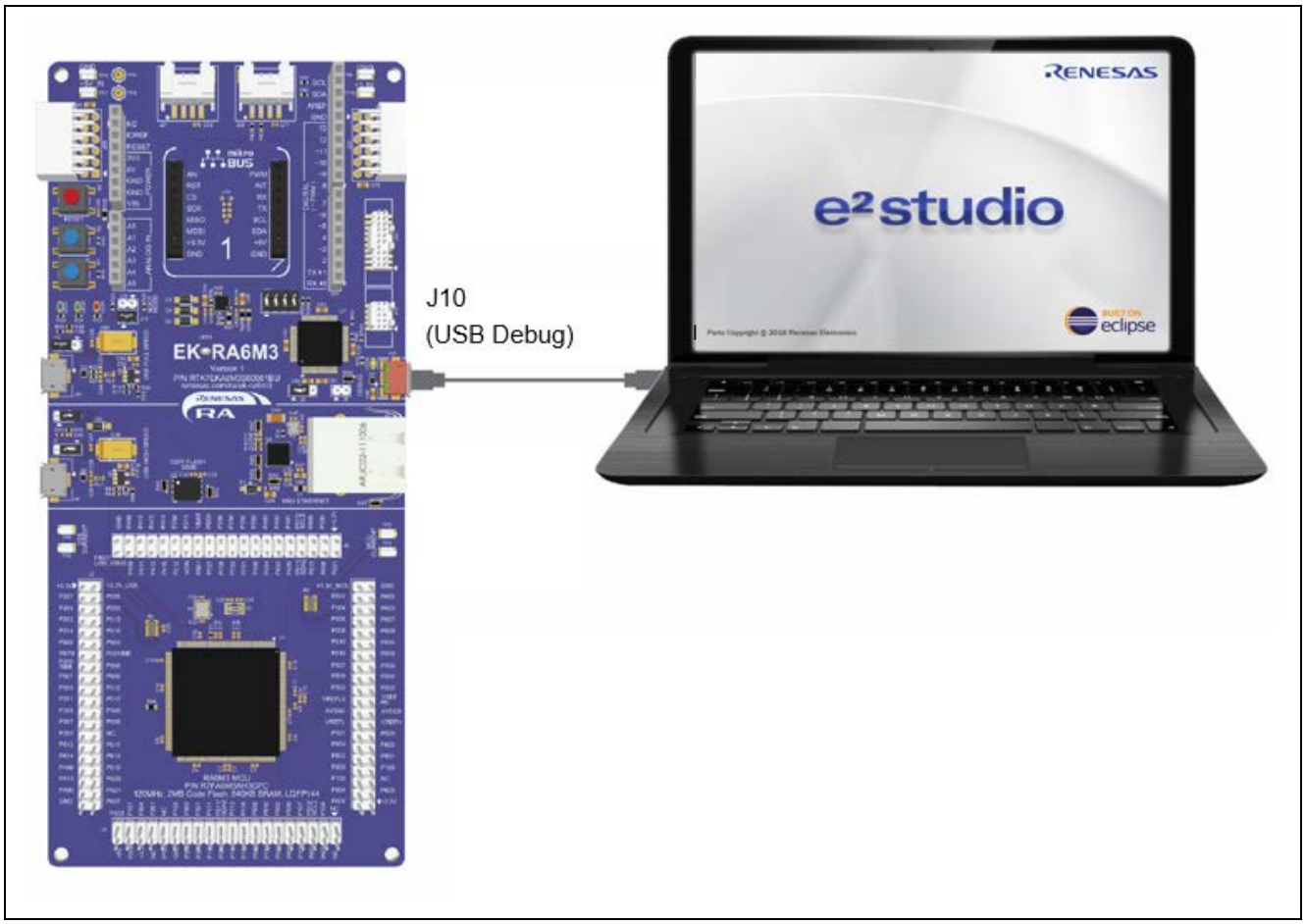



**Figure 21. Connecting the EK-RA6M3 Board to the Host PC via USB Debug Port**

2. Verify that the debug LED (LED5) stops blinking and lights up orange indicating that the J-Link drivers are detected by the EK-RA6M3 board.

Note: The debug LED (LED5) continues to blink when J-Link drivers are not detected by the EK-RA6M3 board. In that case, make sure that the EK-RA6M3 board is connected to the host PC through the micro-B USB debug port (J10) and that J-Link drivers are installed on the host PC by checking in the Windows Device Manager (expand **Universal Serial Bus controller**, and locate **J-Link driver**)



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## 5.5 Downloading and Running the Modified Quick Start Example Project

1. In e² studio, click the drop-down menu for the debug icon, select **Debug As** option, and choose **Renesas GDB Hardware Debugging.**

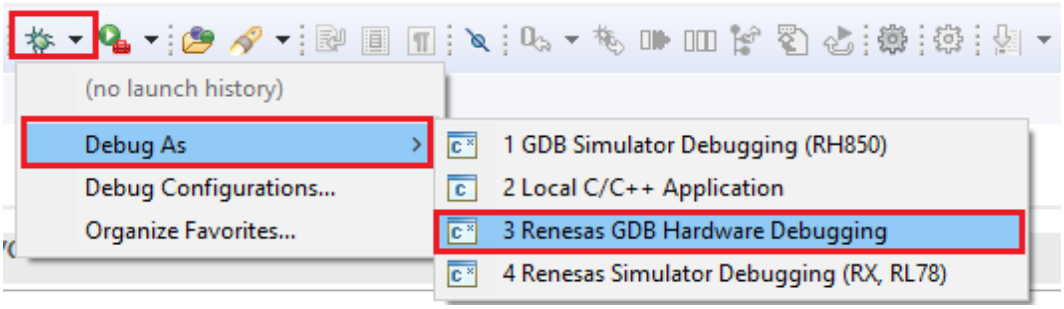



**Figure 22. Selecting the Debug Option**

2. A dialog box may appear. Click **Yes**.

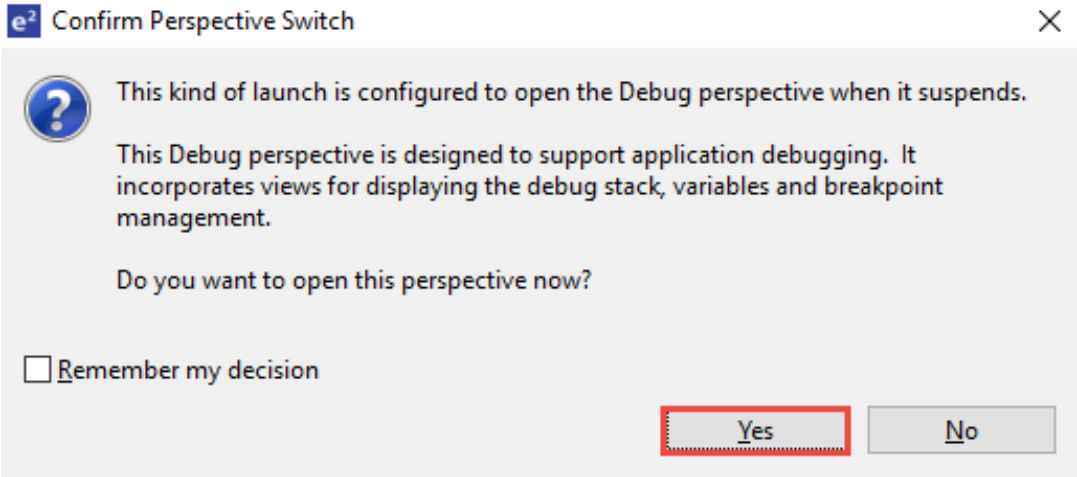



**Figure 23. Opening the Debug Perspective**

3. Press **F8** or click **Resume** icon to begin executing the project.

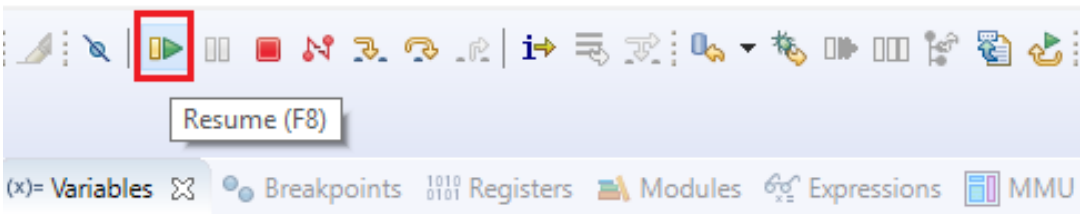



**Figure 24. Executing the Project**

4. The modified Quick Start example project is programmed into the EK-RA6M3 board and is running. The project can be paused, stopped, or resumed using the debug controls.



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## 6. Next Steps

1. To learn more about the EK-RA6M3 kit, refer to the EK-RA6M3 user's manual and design package available in the Documents and Download tabs respectively of the EK-RA6M3G webpage at renesas.com/ra/ek-ra6m3.
2. Renesas provides several example projects that demonstrate different capabilities of the RA MCUs. These example projects can serve as a good starting point for users to develop custom applications. Example projects (source code and project files) for EK-RA6M3 kit are available in the EK-RA6M3 Example Projects Bundle. The example projects bundle is available in the Downloads tab of EK-RA6M3 webpage.
   - Download and extract the example projects bundle (`xxxxxxxxxxxxxxx-ek-ra6m3-exampleprojects.zip`) to a local directory on the host PC.
   - Refer to the list of all example projects (`xxxxxxxxxxxxxxx-ek-ra6m3-exampleprojects.pdf`) available inside the example projects bundle.
   - Browse to the desired example project (for example: adc_ek_ra6m3_ep) in the example projects bundle (`xxxxxxxxxxxxxxx-ek-ra6m3-exampleprojects\ek_ra6m3\adc\adc_ek_ra6m3_ep`)
   - For help on using example projects, refer to `Example Project Usage Guide.pdf` in the RA Example Repository on GitHub at github.com/renesas/ra-fsp-examples/tree/master/example_projects. The archived versions of the source code of the example projects are available the example project repository.

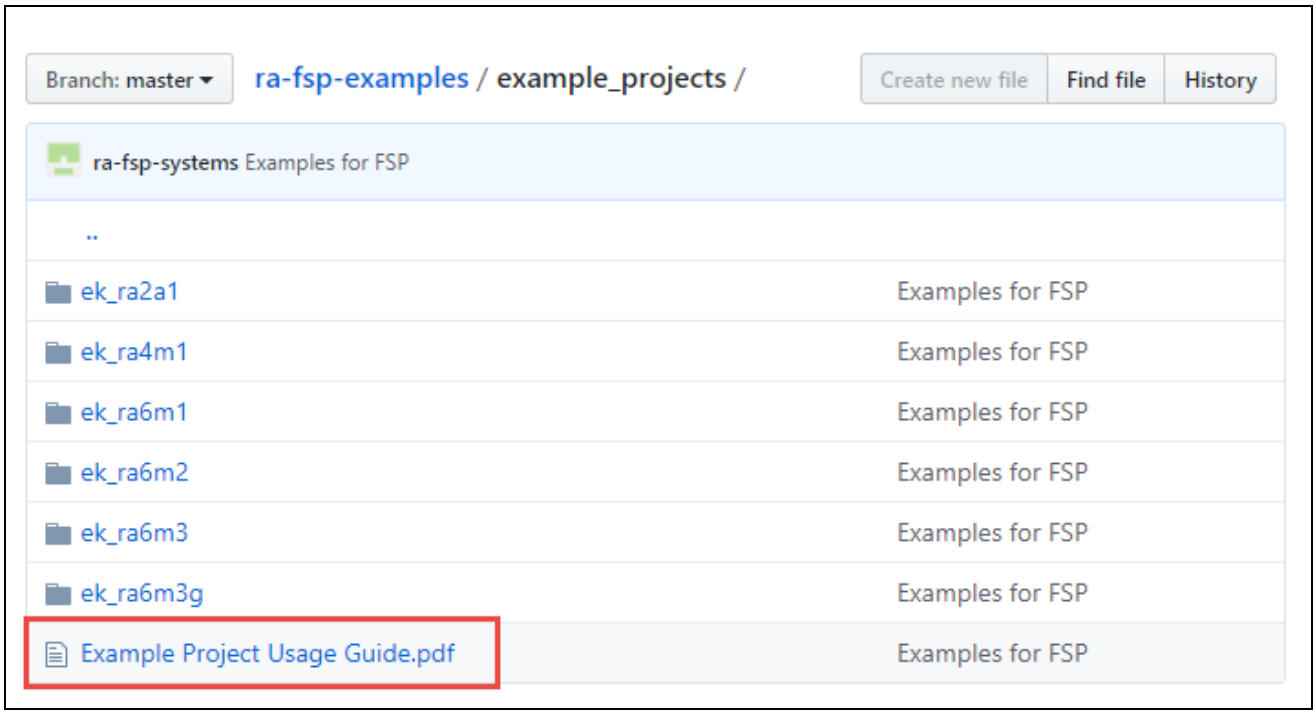



**Figure 25. Example Project Directory Contents**

3. To learn how to create a new e² studio project from scratch, refer to *Chapter 2 Starting Development* in the FSP User Manual (renesas.com/ra/fsp). To learn how to use e² studio, refer to the User Manual provided on the e² studio webpage (renesas.com/software-tool/e-studio).



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## 7. Website and Support

Visit the following URLs to learn about the kit and the RA family of microcontrollers, download tools and documentation, and get support.

| | |
|---|---|
| EK-RA6M3 Resources | renesas.com/ra/ek-ra6m3 |
| RA Product Information | renesas.com/ra |
| RA Product Support Forum | renesas.com/ra/forum |
| Renesas Support | renesas.com/support |

### Provide Feedback/ Request a Feature

Renesas aims to provide the best microcontroller kit experience to help jumpstart customer innovation with RA family of microcontrollers and take products to market faster. The Renesas RA microcontroller kits have been designed with a lot of attention-to-detail and customer-centric thinking at every aspect of design. Renesas aims to exceed customer expectations.

Renesas looks forward to hearing your feedback and knowing how we can enhance your experience. Please share your feedback at renesas.com/ra/kitfeedback.



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## Revision History

| Rev. | Date | Description | |
|---|---|---|---|
| | | Page | Summary |
| 1.00 | Sep.17.19 | — | Initial release |
| 1.01 | Nov.15.19 | — | Updated sections 5.2, Downloading and Importing the Quick Start Example Project and 6, Next Steps. |
| 1.02 | Jun.12.20 | 12, 20 | Updated Example Project information |
| 1.03 | Oct.12.21 | 21, 22 | Added step 3 to section 6, Next Steps and the **Provide Feedback/ Request a Feature** information to section 7, Website and Support. |



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